

ABSTRACT

An ultra high speed APD capable of realizing reduction in an operating voltage and quantum efficiency enhancement at the same time is provided. Under operating conditionsAPD, a doping concentration distribution of each light absorbing layer is determined so that a p-type light absorbing layer (16) maintains a p-type neutrality except a part thereof, and a low concentration light absorbing layer (15) is depleted. Moreover, a ratio between a layer thickness W_{AN} of the p-type light absorbing layer (16) and a layer thickness W_{AD} of the low concentration light absorbing layer (15) is determined so that $W_{AD} > 0.3 \mu\text{m}$ and a delay time of an element response accompanying a transit of carriers generated in the light absorbing layer by light absorption takes on a local minimum under a condition that a layer thickness $W_A (= W_{AN} + W_{AD})$ of the light absorbing layer is constant.